Practice Problems – Ch. 3, sec. 4-7

Name \_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_\_ Block \_\_\_\_\_\_\_\_\_\_\_\_\_\_

3.40 Phenol, commonly known as carbolic acid, was used by Joseph Lister as an antiseptic for surgery in 1865. Its principal use today is in the manufacture of phenolic resins and plastics. Combustion of 5.23 mg of phenol yields 14.67 mg CO2 and 3.01 mg H2O. Phenol contains only C, H, and O. What is the percentage of each element in this substance?

3.43 Two compounds have the same composition: 88.83% C and 11.17% H.

a. Obtain the empirical formula corresponding to this composition.

b. One of the compounds has a molecular weight of 54.08 amu; the other has a molecular weight of 108.16 amu. Obtain the molecular formulas of both compounds.

3.44 Two compounds have the same composition; 85.65% C and 14.38% H.

a. Obtain the empirical formula corresponding to this composition.

b. One of the compounds has a molecular weight of 28.03 amu; the other has a molecular weight of 56.06 amu. Obtain the molecular formulas of both compounds.

3.45 Putrescine, a substance produced by decaying animals, has the empirical formula C2H6N. Several determinations of molecular weight give values in the range of 87 to 90 amu. Find the molecular formula of putrescine.

3.46 Compounds of boron with hydrogen are called boranes. One of these boranes has the empirical formula BH3 and a molecular weight of 28 amu. What is its molecular formula?

3.54 Acrylonitrile, C3H3N, is the starting material for the production of a kind of synthetic fiber (acrylics). It can be made from propylene, C3H6, by reaction with nitric oxide, NO.

4C3H6 + 6NO = 4C3H3N + 6H2O + N2

How many grams of acrylonitrile are obtained from 651 kg of propylene and excess NO?